

# (12) UK Patent Application (19) GB (11) 2 383 957 (13) A

(43) Date of A Publication 16.07.2003

(21) Application No 0225364.9

(22) Date of Filing 31.10.2002

(30) Priority Data

(31) 0103717

(32) 09.11.2001

(33) SE

(71) Applicant(s)

SCA Hygiene Products AB  
(Incorporated in Sweden)  
S-405 03 Göteborg, Sweden

(72) Inventor(s)

Ted Guidotti  
Gunnar Edwardsson,  
Anna-Gerd Doverbo

(74) Agent and/or Address for Service

Boult Wade Tennant  
Verulam Gardens, 70 Gray's Inn Road,  
LONDON, WC1X 8BT, United Kingdom

(51) INT CL<sup>7</sup>

A61F 13/539 // A61F 13/15

(52) UK CL (Edition V)

A5R RPL

(56) Documents Cited

WO 2000/000145 A1

US 6346097 A

US 2681032 A

(58) Field of Search

UK CL (Edition V) A5R

INT CL<sup>7</sup> A61F

Other: EPODOC, PAJ, WPI

(54) Abstract Title

**Absorbent article comprising an absorbent structure that moves in response to wetness**

(57) The absorbent article 1 comprises at least two absorbent structures 4a, 4b or pads which overlap one another and are enclosed between a surface layer 2 and a backing layer 3. At least one of the pads is attached to a remote part of the article 26 by means of elastic 24 and is retained in place by means of a soluble adhesive 23. When the pad becomes saturated the adhesive will fail and the elastic will move the first absorbent means away from the acquisition zone such that the underlying pad will be subject to subsequent urine discharge. The elastic 24 may shrink on exposure to wetness or may be a body that expands as it absorbs water to push the pad 4a out of the acquisition zone.

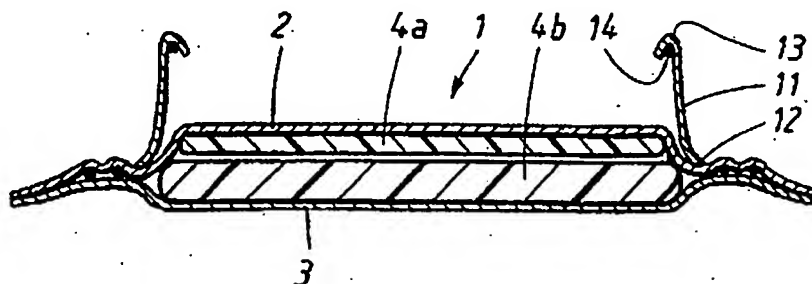


FIG. 2

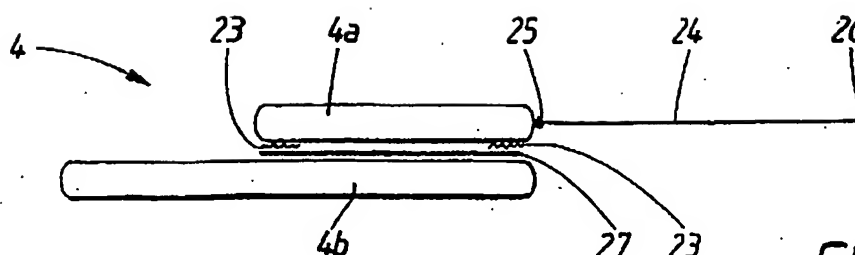
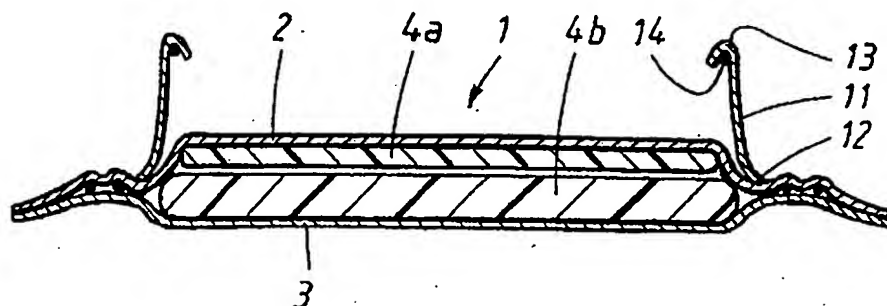
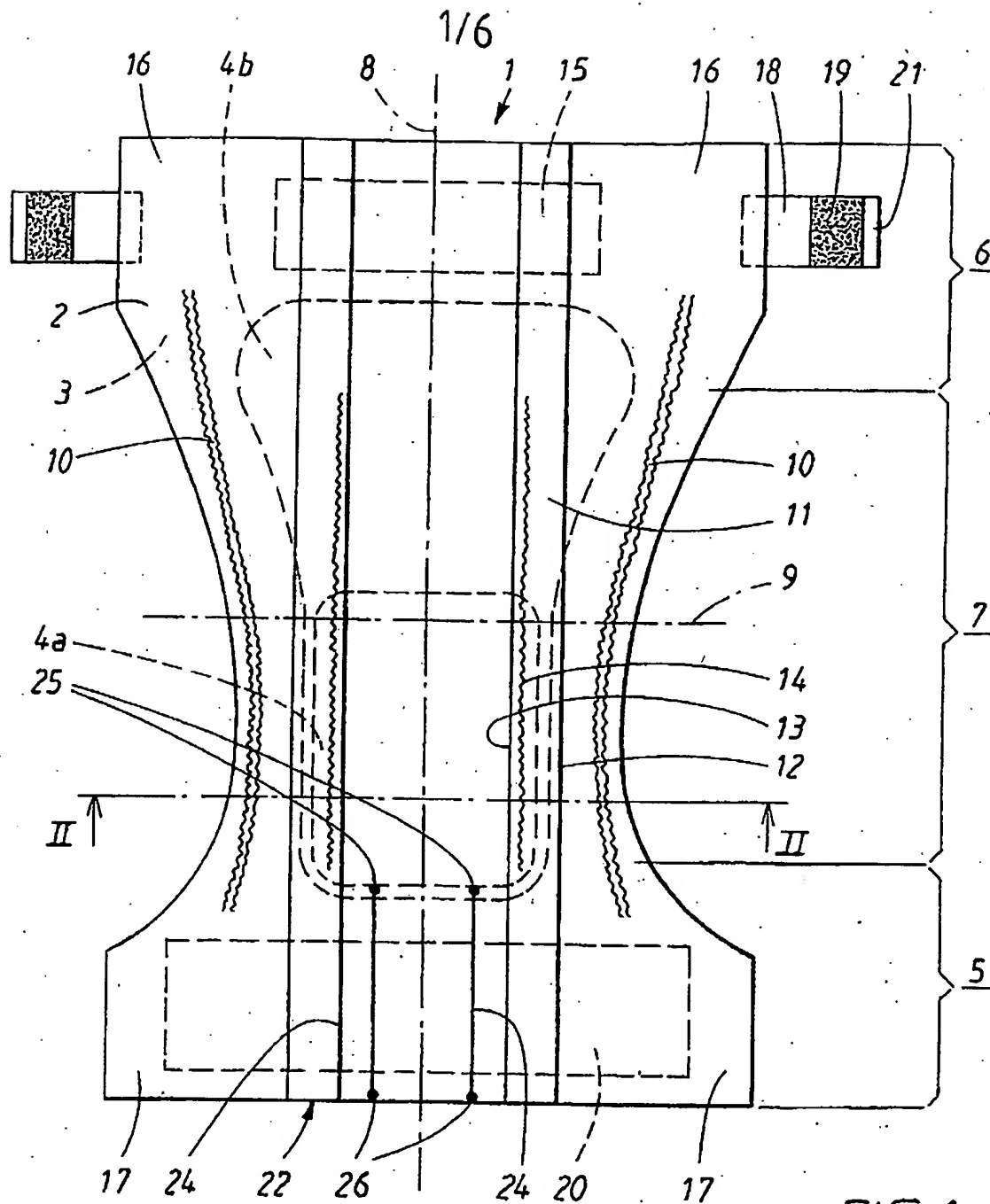


FIG. 3a

GB 2 383 95



2/6

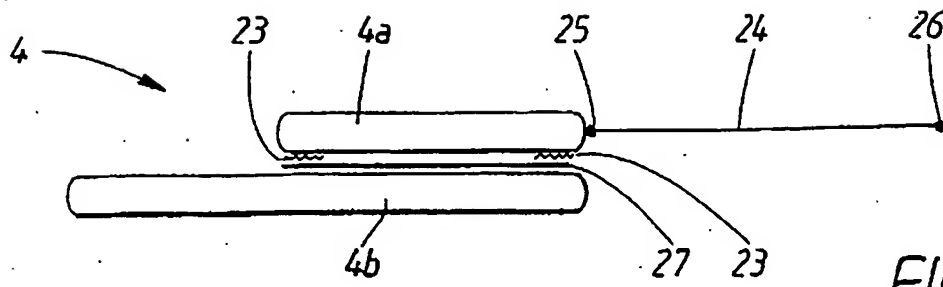


FIG. 3a

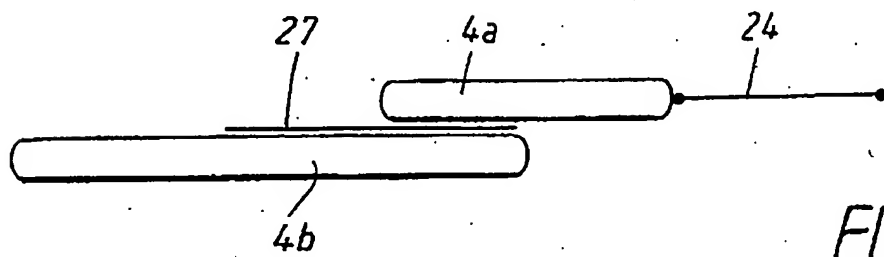


FIG. 3b

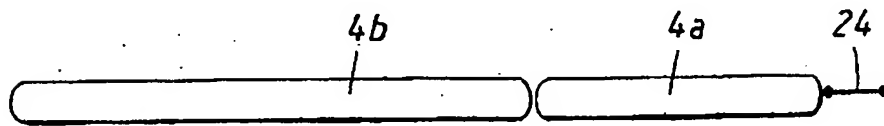


FIG. 3c

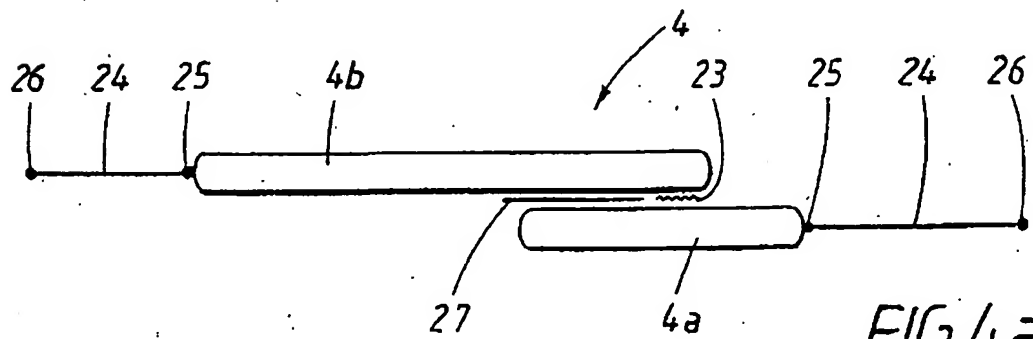


FIG. 4a

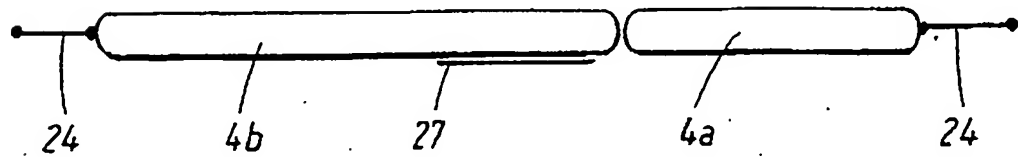
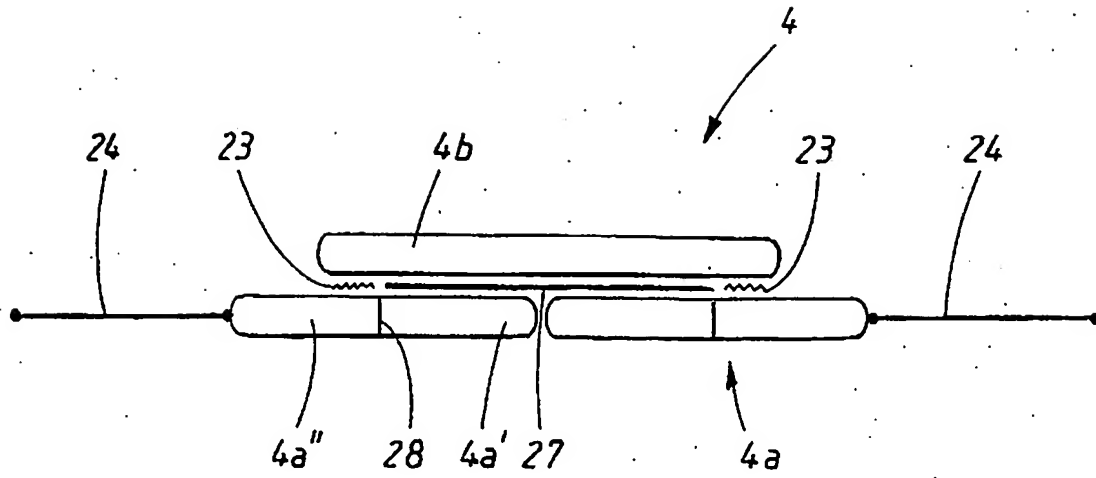
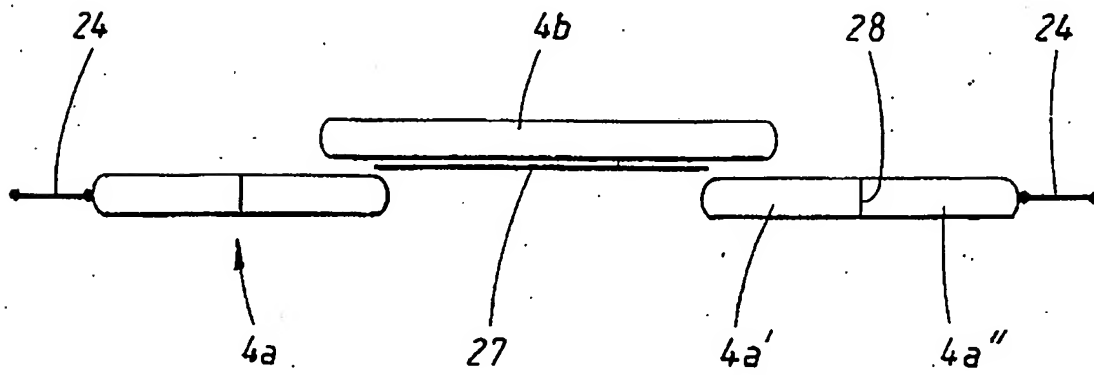


FIG. 4b

FIG. 5aFIG. 5b

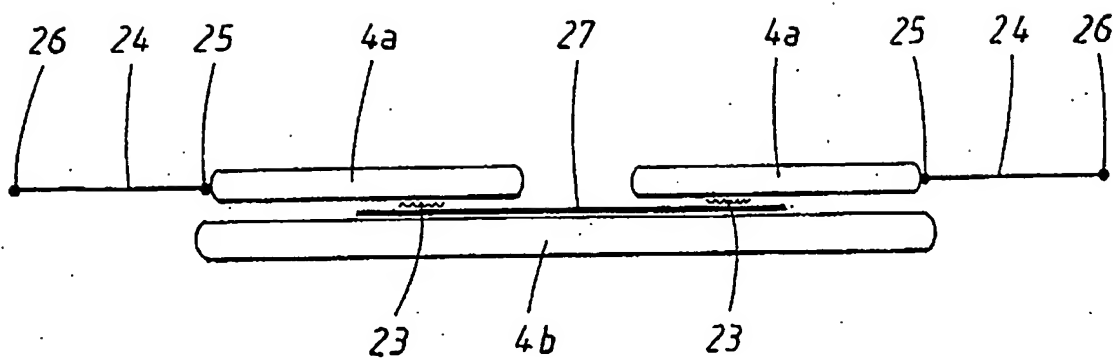


FIG.6c

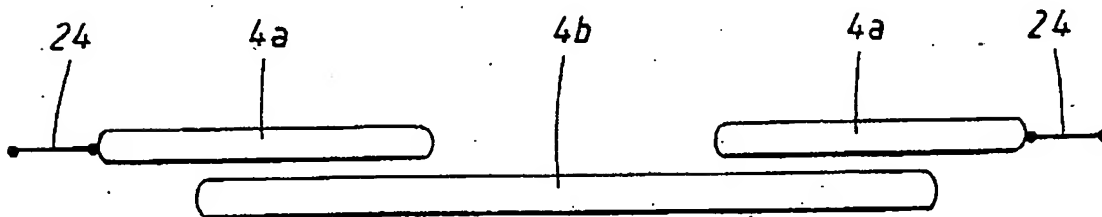


FIG.6d

5/6

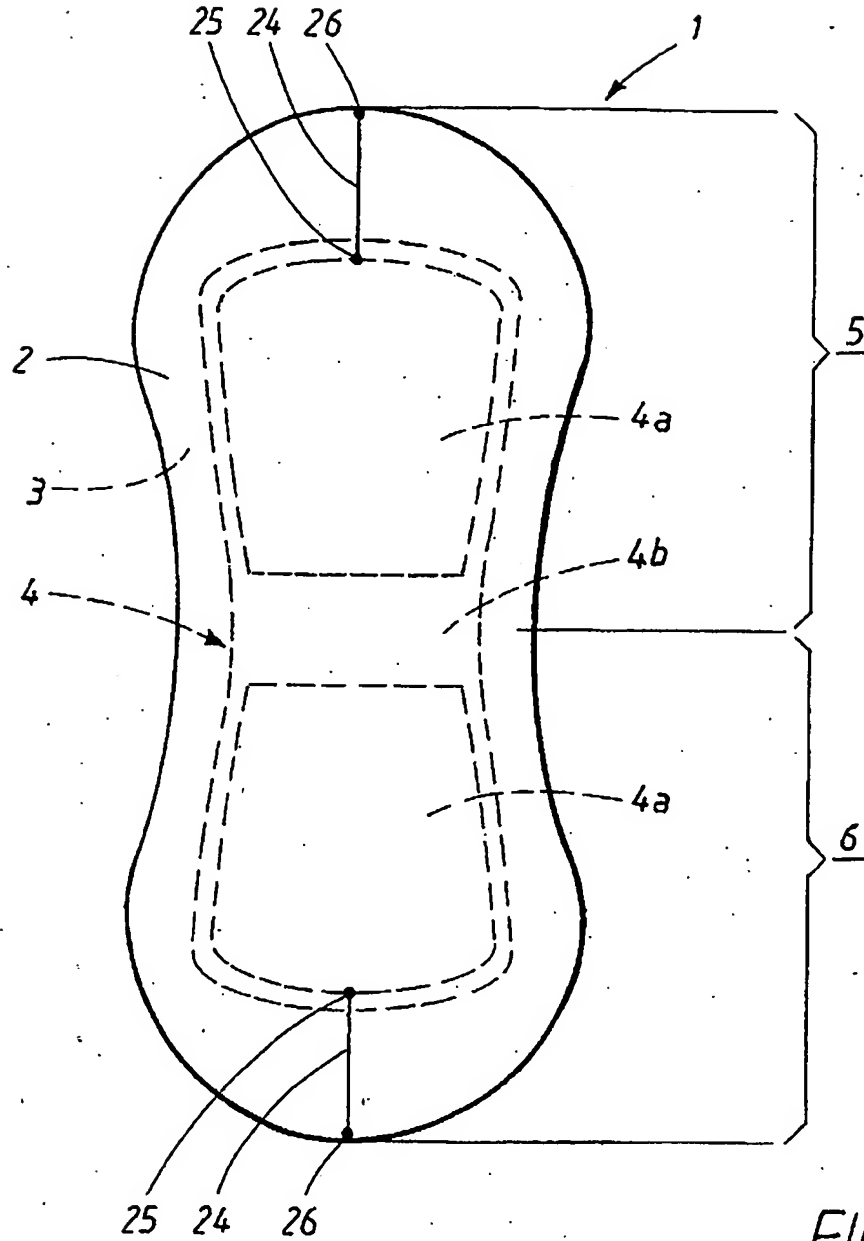


FIG. 6a

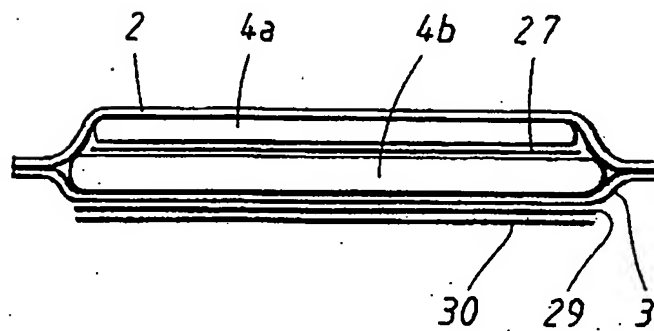


FIG. 6b

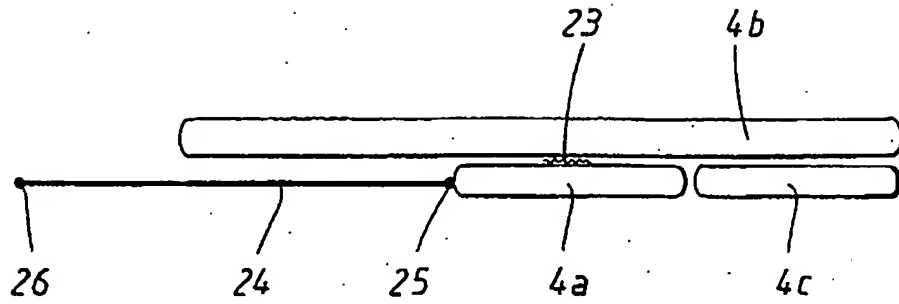


FIG. 7a

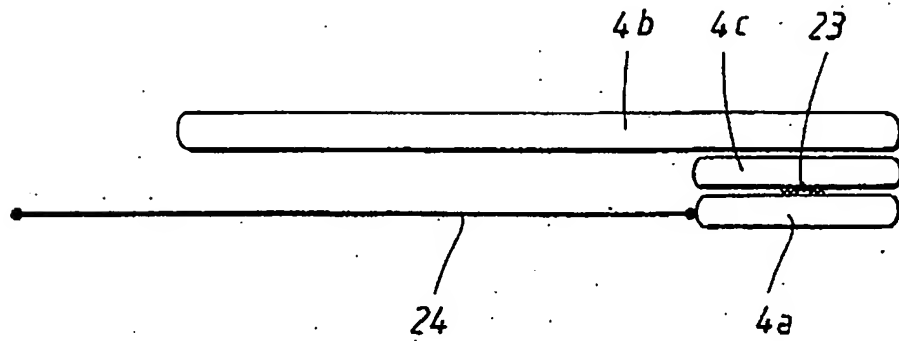


FIG. 7b

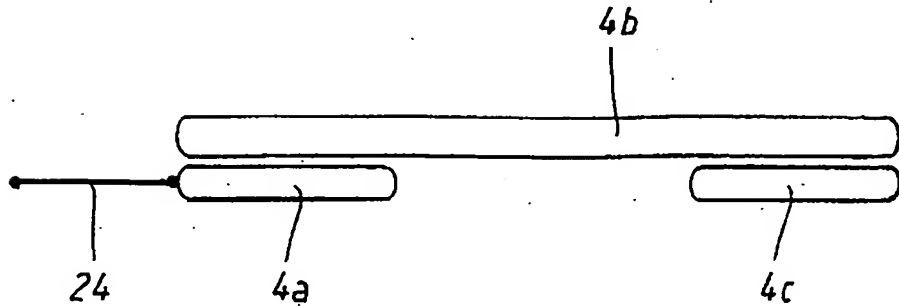


FIG. 7c

## ABSORBENT ARTICLE COMPRISING AN ABSORBENT STRUCTURE

## TECHNICAL FIELD

- 5 The present invention relates to an absorbent article, such as a diaper, an incontinence pad, a sanitary towel or the like, comprising an absorbent structure.

## BACKGROUND ART

10

- Conventional absorbent structures for use in absorbent articles, such as, for example, diapers, incontinence pads, sanitary towels or the like, usually have one or more absorption bodies or absorbent layers arranged one on another. The absorbent layers can have different constructions and compositions in
- 15 order for the absorbent structure to have characteristics which are suitable for the absorbent article in which it is to be used. An absorbent structure for the absorption of urine suitably has a construction and material composition suitable for taking up, spreading and retaining urine, and, in the same way, a structure for the absorption of blood or menstrual fluid has characteristics
- 20 which are adapted for taking up, spreading and retaining such liquids. As, for example, menstrual fluid and urine require different types of absorbent structure for optimum absorption, the structures often look different in terms of construction and material composition. In addition to suitably being adapted to the liquid to be absorbed, the structure should also be adapted to
- 25 the materials which surround the structure because the various materials interact with one another during the absorption process itself. What are known as superabsorbent polymers (SAPs) are usually mixed into the absorbent structure so that its absorption capacity and ability to retain liquid are increased. A superabsorbent is a material in the form of fibres, particles,
- 30 granules, film, foam or the like, which has the capacity to absorb liquid corresponding to several times the weight of the superabsorbent material itself. The superabsorbent material binds the liquid and forms a liquid-



containing gel. Examples of this type of conventional absorbent structure are given in EP 0 401 189 A1, US 4,610,678 A, US 4,834,735 A, WO 93/15702 A1 and WO 94/10957 A1.

- 5 One problem with this type of conventional absorbent structure is that it can have problems actually taking up liquid. In the case of the absorption of urine in, for example, a diaper, it is often a matter of relatively rapid take-up of large quantities of urine in a number of discharges or what may be referred to as wettings, which means that the diaper has to be optimized according to
- 10 such a type of absorption process. The first wetting is often absorbed rapidly and without problems of leakage or run-off, as the absorbent structure is then empty and receptive to liquid. Subsequent wettings, on the other hand, are absorbed less rapidly than the first because the absorbent structure is then already partly filled with liquid, for which reason it may be difficult for the
- 15 diaper to absorb all the urine sufficiently rapidly when a subsequent wetting takes place, which often results in leakage. The problem is especially marked when the absorption core contains large quantities of superabsorbents. In the case of rapid processes, what is known as gel-blocking of the superabsorbents can occur, which is a consequence of the fact that the
- 20 superabsorbent swells during liquid take-up. The actual gel-blocking arises when the superabsorbents in the absorption core swell up in such a manner that they clog the free surfaces in the absorbent structure. When gel-blocking occurs, the spreading of liquid in the absorbent structure is therefore effectively prevented, and the liquid then runs off the structure instead of
- 25 being absorbed. A further problem with superabsorbents in large quantities is that the absorbent structure can become unwieldy and cumbersome for the person wearing the absorbent article because the superabsorbents swell up after liquid take-up and form a jelly-like mass.
- 30 Another problem with conventional absorption bodies is that the total absorption capacity is not utilized to as great an extent as is desirable. When, for example, wetting by urine takes place in a diaper, the liquid ends up in

most cases in a single place, which means that the absorbent structure has to absorb a very large amount of liquid within a very limited area. In order for this to be possible at all, the absorbent structure must effectively be capable of moving the liquid to unused parts of the structure. The movement of liquid in the structure takes place by capillary spreading and this spreading is seldom adequate to obtain good liquid distribution with a high degree of utilization of the absorbent structure. Inadequate liquid-spreading with large quantities of liquid in a limited part of the absorbent article can also lead to the article feeling uncomfortable to the wearer. The liquid weighs the article down in the crotch portion and strains the elastic in such a manner that the article hangs down on the wearer. A better distribution of the liquid over a greater part of the article would therefore result in a better wet fit and a more comfortable absorbent article for the wearer.

WO 00/00145 A2 describes an absorbent article comprising an absorbent core, where the absorbent core can be moved by a movement means which is attached by a first part to the core and anchored by a second part to the article. The movement means consists of a moisture-sensitive material, for example a thread, which shrinks when it is exposed to wetting. One disadvantage of this type of structure is that the movement of the absorbent core may be difficult to define because the movement means acts on the core as soon as it has been exposed to wetting. This means that a first wetting which may not by any means contain great quantities of liquid can bring about unwanted movement of the absorption core.

## SUMMARY OF THE INVENTION

The object of the present invention is to remedy the abovementioned problems and to design an absorbent article with an absorbent structure which effectively utilizes the absorption capacity of the structure so as to afford a better fit and in order to minimize the occurrence of leakage.

An absorbent article according to the present invention is characterized in that it comprises an absorbent structure enclosed between a surface layer and a backing layer, where the absorbent structure consists of at least one first absorption body and a second absorption body which are arranged so  
5 that each first absorption body completely or partly overlaps the second absorption body, and at least one transport means arranged on each first absorption body, each first absorption body being anchored to the article by a soluble means of attachment.

## 10 DESCRIPTION OF THE INVENTION

By means of the present invention, an absorbent article has been produced, comprising an absorbent structure of the type referred to in the introduction, which article essentially eliminates the problems mentioned above.

15

The absorbent article consists of, for example, diapers, incontinence pads, sanitary towels or the like and comprises an absorbent structure for taking up liquids such as menstrual fluid, blood, urine, stools and the like. The absorbent structure is enclosed between a liquid-permeable surface layer  
20 which faces the wearer during use of the article and a liquidtight backing layer facing away from the wearer. The surface layer and the backing layer have an extent in the plane which is slightly greater than the absorbent structure and therefore extend outside its edges. The article has a front portion intended to face forwards on the wearer and a rear portion intended  
25 to face backwards on the wearer. If the article consists of a diaper or the like, it can also be provided with a narrower crotch portion which is intended to be positioned in the crotch of the wearer between the legs of the latter. The absorbent article is suitably symmetrical in relation to a longitudinal axis running in the longitudinal direction of the article. The transverse direction is  
30 the direction extending across the article and is parallel or essentially parallel to a transverse axis which forms a right angle with the longitudinal axis. The

absorbent structure consists of at least one first absorption body and a second absorption body of suitable type.

At least one of the absorption bodies is arranged movably in the article in such a manner that it can be moved from an original position to a position different from the original position when the absorbent structure has been exposed to one or more wettings. In order to ensure that the absorption body is not moved before it has reached a certain saturation with liquid, it is anchored to the article by a means of attachment arranged in such a manner in the article that the means of attachment will with great likelihood come into contact with the liquid which, when the wetting or wettings take place, is stored in the absorption body. The means of attachment is designed in such a manner that it is dissolved when it comes into contact with the liquid. Suitable means of attachment are substances which are acted on by the liquid or a component forming part of the liquid in such a manner that their adhesive capacity is lost or substantially weakened. The means of attachment can consist of substances which react to a change, a substance or a state in the environment. In order to bring about movement, a transport means is arranged on the absorption body. The transport means can consist of an elastic thread, an elastic band, a material which shrinks when it is exposed to liquid or an expanded material, for example a foamed material.

According to a first embodiment of the invention, the absorbent structure consists of a first and a second absorption body. The first absorption body is arranged at least partly on top of and anchored by means of attachment to the second absorption body. The first absorption body is arranged movably in the article and is moved from its original position by a transport means consisting of, for example, one or more elastic threads.

According to a second embodiment of the invention, the absorbent structure comprises a first and a second absorption body. Both the absorption bodies are arranged movably in relation to the rest of the article. In the original

position, the absorption bodies overlap one another at least partly and they can be anchored to one another by means of attachment.

According to a third and a fourth embodiment of the invention, the absorbent  
5 structure consists of two movable first absorption bodies and a non-movable second absorption body.

According to a fifth embodiment of the invention, the absorbent structure  
comprises a first movable absorption body, a non-movable second  
10 absorption body and a non-movable third absorption body.

#### BRIEF DESCRIPTION OF THE FIGURES

The invention will be described in greater detail below with reference to the  
15 illustrative embodiments shown in the drawings, in which

Figure 1 shows a diaper according to the invention, seen from above;

Figure 2 shows a section along the line II-II through the diaper in  
20 Figure 1;

Figures 3a-c show an absorbent structure according to a first embodiment;

Figures 4a-b show an absorbent structure according to a second  
25 embodiment;

Figures 5a-b show an absorbent structure according to a third embodiment;

Figures 6a-d show an absorbent structure according to a fourth  
30 embodiment, and

Figures 7a-c show an absorbent structure according to a fifth embodiment.

## DESCRIPTION OF FIGURES AND EMBODIMENTS

The absorbent article shown in the figures consists of a diaper or an incontinence pad 1 and comprises an absorbent structure 4. The absorbent structure 4 is enclosed between a liquid-permeable surface layer 2 and a liquidtight backing layer 3.

The liquid-permeable surface layer 2 preferably consists of a material which has characteristics such as dryness and softness during use of the absorbent article because this layer lies against the body of the wearer. It is desirable for the layer to have a soft and textile-like surface which remains dry even after repeated wettings. The surface layer can consist of, for example, a non-woven material with a soft and smooth surface such as, for example, a spunbond consisting of polypropylene fibres, a meltblown material or a bound carded fibrous material. In order to keep the surface next to the skin of the wearer dry, use can be made of a hydrophobic non-woven material which is perforated so that openings are formed in the material which are larger than the interstices between the fibres in the material. In this way, liquid can be conducted down through the perforations in the surface layer to the underlying absorption body. Other examples of materials for the surface layer could be perforated plastic films such as, for example, perforated polyethylene film.

The liquidtight backing layer 3 can consist of a thin film of polyethylene (PE), polypropylene (PP) or another suitable material, a hydrophobed non-woven layer, or a laminate of a thin film and a non-woven material. This type of laminate is often used in order to obtain a soft and textile-like outer side on the backing layer. In order to produce a more airy and comfortable article, it is also possible to use breathable backing layers which prevent liquid from escaping from the absorbent article but which allow moisture to be ventilated out. These breathable backing layers can consist of single material layers or of laminates consisting of, for example, blown or cast polyethylene films

which are laminated with, for example, a non-woven layer consisting of spunbond or spunbond-meltblown-spunbond (SMS).

- 5 The surface layer 2 and the backing layer 3 have a slightly greater extent in the plane than the absorbent structure 4 and extend outside its edges. The layers 2 and 3 are at least in part interconnected within the projecting portions, for example by gluing or welding using heat or ultrasound. They can also be connected to the absorption body by, for example, glue.
- 10 The absorbent structure 4 consists of at least one first absorption body 4a and a second absorption body 4b (see Figures 1-3) which can be of any conventional type. The absorption bodies are usually constructed from one or more layers of cellulose fibres, for example cellulose fluff pulp. Other materials which can be used are, for example, absorbent non-woven
- 15 materials, foamed materials, synthetic fibrous materials or peat moss. In addition to cellulose fibres or other absorbent materials, the absorption bodies can also contain superabsorbent material, or superabsorbent polymers (SAPs), that is to say material in the form of fibres, particles, granules, film or the like, which has the capacity to absorb liquid
- 20 corresponding to several times the weight of the superabsorbent material itself. The superabsorbent material binds the liquid and forms a liquid-containing gel. The absorption bodies can also comprise binders, shape-stabilizing components or the like. Additional absorption layers which improve the absorption characteristics can also be used, such as various types of
- 25 liquid-spreading material layer or insert, what is known as wadding. The absorption bodies can be treated chemically or physically in order to modify the absorption characteristics. It is possible, for example, to provide an absorption layer with compressions in order to control the liquid flow in the absorption body. It is also possible to enclose the absorbent layer(s) in a
- 30 covering made of, for example, tissue material. The absorption bodies can have a shape which is elongate in the longitudinal direction and can be, for example, essentially rectangular, T-shaped or hourglass-shaped. In a T-

shaped absorption body, the transverse part is intended to face the front portion of the absorbent article during use so that it lies in the area around the abdomen of the wearer during use. An hourglass-shaped absorption body is wider in the front and rear portions than in the crotch portion in order  
 5 to afford effective liquid take-up at the same time as the design makes it easier for the article to shape itself and close snugly around the wearer.

The diaper is intended to surround the lower part of the trunk of the wearer like a pair of absorbent pants. It has a front portion 5 intended to face  
 10 forwards on the wearer during use, a rear portion 6 intended to face backwards on the wearer during use, and a narrower crotch portion 7 located between the front and rear portions and intended to be arranged in the crotch of the wearer between the legs of the latter.

15 The diaper is suitably symmetrical in relation to a longitudinal axis 8 running in the longitudinal direction of the diaper. The transverse direction of the diaper is the direction extending across the article and is parallel or essentially parallel to a transverse axis 9 which forms a right angle with the longitudinal axis 8.

20 Those parts on either side of the crotch portion 7 in the transverse direction which extend outside the absorbent structure are preferably provided with one or more elastic means 10 which essentially run in the longitudinal direction of the diaper. The elastic means 10 function as leg elastic and their  
 25 purpose is to prevent liquid and stools leaking out through the longitudinal side edges of the diaper, thus forming outer liquid barriers. The elastic means can consist of one or more elastic threads or strips which are applied in a stretched state between the backing layer and the surface layer. Alternatively, the elastic can be arranged between the layers in an  
 30 unstretched state, and the two layers instead are then stretched on application. It is also possible to arrange the elastic on the outside of the backing layer or on the inside of the surface layer.



In order further to prevent liquid or stools leaking out, the absorbent article can also be provided, on the side facing the wearer, with inner liquid barriers, or standing gathers, 11 which are attached adjacent to the longitudinal edges inside the outer liquid barriers. The inner liquid barriers 11 are preferably  
5 made from an essentially liquid-impermeable material such as, for example, a hydrophobic non-woven or a plastic film and are designed as a longitudinal web with a first edge 12 which is connected to the absorbent article and a second, free edge 13 which is intended to lie against the wearer during use of the absorbent article. The second edge is provided with one or more  
10 elastic elements 14, preferably an elastic thread, which in the contracted state gathers the free edge so that an upright barrier is formed. The inner barrier can be designed as a strip consisting of a single layer, where the free edge is turned down in order to enclose the elastic element so as to prevent direct contact between the elastic thread and the wearer. Alternatively, the  
15 barrier can be formed by two layers joined together, with the elastic thread attached at the edge of the free end between the two layers. In this case, the inner layer of the barrier can consist of an extension of the surface layer, and the outer layer can consist of an essentially liquid-impermeable material, or the inner and outer layers of the barrier can consist of one and the same  
20 material strip which is folded around the elastic thread.

The rear and/or front portions of the article can also be provided with what is known as waist elastic 15 which consists of elastic means arranged along the front and/or rear end edges so that the article surrounds the waist of the  
25 wearer in a gentle and comfortable manner. The elastic means are suitably attached between the backing layer and the surface layer by glue or by welding, for example ultrasonic welding. The elastic means can consist of one or more elastic threads which are applied in a stretched state between the layers and thus form the waist elastic. Alternatively, the elastic can be  
30 arranged between the layers in an unstretched state, and the two layers instead are then stretched on application. Another common variant of elastic which is suitable is constituted by elastic foamed materials consisting of a

thin strip of, for example, polyurethane foam which can be arranged between the two layers in the same way as the elastic threads. It is also possible of course to position the elastic means for the waist elastic on the outside of the backing layer or on the inside of the surface layer.

5

Those parts of the rear portion of the diaper which, in the transverse direction on either side of the longitudinal axis 8, extend outside the absorption body constitute the rear side panels 16 of the diaper. In the same way, the absorbent article can be provided with front side panels 17. A fastening system for securing the absorbent article around a wearer is assigned to the front or rear side panels of the absorbent article. The fastening system consists of at least one fastening tab 18 and of a receiving part 20 for the fastening tab 18. The fastening tab 18 is intended to interconnect the rear and front portions of the absorbent article by virtue of a fastening means 19 arranged on the fastening tab 18 being fastened to the receiving part 20 which is arranged on the front or rear portion of the article. The article is preferably provided with two fastening tabs arranged on the rear side panels, one fastening tab on each rear side panel 16, and a receiving part 20 on the front portion 5 of the article, on the side facing away from the wearer during use of the diaper, that is to say on the outside of the backing layer.

20

The fastening tabs 18 are connected to the rear side panels 16 in the areas lying at the side edge of the side panels which runs in the longitudinal direction. The connection can be effected by, for example, glue, tape, heat sealing or welding at individual points, along lines or over continuous surface areas. The fastening tabs 18 can be attached to the backing layer of the absorbent article, the surface layer, between the backing layer and the surface layer, or be designed so that the tabs are attached so that one part of the tab lies on the outside of the backing layer and another part of the tab lies on the inside of the article, that is to say on that side of the surface layer facing the wearer.

25

30

The fastening means 19 preferably consists of a male part of a touch-and-close, or hook and loop, band. The fastening means 19 is attached to the fastening tab 18 by, for example, glue, tape, thermal connection or by another suitable means, on that part of the fastening tab 18 which faces  
5 away from the rear side panels 16 of the article and on that side of the fastening tab 18 which faces the receiving part 20 during use of the diaper. That part of the fastening tab 18 which is arranged outside the fastening means 19 in the lateral direction constitutes a gripping tab 21, the purpose of which is to facilitate application and removal of the fastening means to and  
10 from the receiving part 20.

The receiving part 20 is suitably designed as a strip which extends essentially parallel to the front end edge 22 of the diaper, that is to say in the transverse direction of the diaper, and consists of a material which is adapted  
15 for interaction with the fastening means 19. The extent of the receiving part in the transverse direction of the diaper can vary depending on model and size and can therefore extend along the entire front end edge 22 of the diaper or along a part of it. The receiving part suitably extends along a relatively great part of the front end edge 22 so that it extends over the front side panels in  
20 order that as good an adjustment as possible of the diaper to the wearer can be obtained. The receiving part 20 preferably consists of the female part (the loop part) of a hook and loop band, and the fastening means 19 of the male part (the hook part) of the hook and loop band. It would also be possible to use the hook and loop parts the other way round, but the loop part is more  
25 suitable for the receiving part because it does not have the same problems as a hook part which easily catches in clothing or other materials.

Figures 3a-c show a first embodiment of an absorbent structure 4 according to the invention, seen from the side in the longitudinal direction. The second  
30 absorption body 4b is positioned in the article next to the liquidtight backing layer 3, that is to say in that part of the article which faces away from the wearer during use. A first absorption body 4a is arranged on top of the

second absorption body so that it is completely or partly overlapped by the second absorption body 4b. The first absorption body 4a is anchored to the article by a means of attachment 23 which is designed in such a manner that it is dissolved when it comes into contact with liquid. Suitable means of attachment are substances which are acted on by the liquid or a component forming part of the liquid in such a manner that their adhesive capacity is lost or substantially weakened. The means of attachment can consist of substances which react to a change, a substance or a state in the environment such as, for example, moisture, enzymes, pH, temperature or salt content. Examples of such substances could be moisture-sensitive glues manufactured from starch, for example polysaccharides, or tissue structures, the bonds of which are dissolved so that the structure collapses when it comes into contact with liquid. Other possible means of attachment can consist of superabsorbent polymers (SAPs), the adhesive capacity of which disappears when the superabsorbents take up liquid, pH-sensitive terpolymers which are dissolved when a certain pH value is reached, or substances which lose their binding capacity when they come into contact with a certain enzyme. The means of attachment can be applied, for example, in layers, in spots or in another suitable pattern. In the embodiment according to Figure 3, the means of attachment 23 lies between the two absorption bodies so that the first absorption body 4a is anchored to the second absorption body 4b. The second absorption body 4b is in turn suitably anchored to the article, for example by being glued to the backing layer 3 by a glue which is not liquid-soluble. The first absorption body 4a can be anchored to parts of the article other than the second absorption body. It is possible, for example, to fasten it by a liquid-soluble glue to the backing layer 3, the surface layer 2 or another suitable part of the article. In this context, the important aspect is that the means of attachment 23 is applied in a place where the likelihood is as great as possible that it will come into contact with liquid when the absorption body has taken up liquid.

Liquid-soluble glue means a glue which is dissolved by the type of liquid the absorbent article is intended to absorb, in this case urine. Examples of this type of glue are starch-based glues, as described above. When the glue 23 is dissolved by the liquid, it loses its adhesive or anchoring capacity, which means that the first absorption body 4a is no longer attached to the article but can be regarded as movable.

The positioning of the movable first absorption body 4a in the article 1 should suitably be such that it takes up liquid on the first wetting of the article. When the article is a diaper or an incontinence pad, the positioning should be such that the first absorption body is located in the front part of the article so that it covers the wetting point to the greatest extent possible. Wetting point means the point or the area in the article within which the wearer discharges urine. On the first wetting of the article, it is therefore the first absorption body which receives the greatest quantity of urine. The liquid spreads through the absorption body and gradually reaches the means of attachment 23 which, after a time, dissolves.

The first absorption body 4a is provided with a transport means 24 for moving the absorption body from its original anchored position. Figure 1 shows two transport means 24, which are attached to the first absorption body. The transport means can consist of elastic threads or elastic bands made of, for example, rubber or another elastic material such as elastic plastic material. The purpose of the transport means 24 is to free unused absorption capacity so that the absorbent structure will have as high a degree of utilization as possible. By moving the first absorption body 4a relative to the underlying second absorption body 4b, new absorption surfaces on the second absorption body are freed, and the absorbent structure is ready to receive liquid on subsequent wettings (see Figure 3b). The movable absorption body is suitably reinforced, for example by tissue layers, binders or the like, so as not to fall apart during the movement itself.

If the transport means 24 consists of an elastic thread, for example made of natural rubber, or the like, it is suitably fastened in a pretensioned state to the first absorption body by one 25 of its ends, and the other end 26 is attached to the absorbent article in a suitable place, for example to the front end portion of the article if the first absorption body 4a is to be moved forwards in the article. The fastening can be effected by the ends 25, 26 of the transport means being fastened by glue or mechanically to the absorption body and, respectively, the article. The pretensioning of the transport means 24 which is required in order to move an absorption body can lie within the range 1-10 N, depending on how great the friction is between the absorption body and surrounding material when the liquid-soluble glue has been dissolved. A good characteristic of an elastic material suitable for the thread is if the tension in the thread increases rapidly under strain and reaches a working level which is relatively constant under continuing strain. The transport means 24 can also consist of an elastic thread which is treated so that it is fixed in a certain position and has a built-in pretensioning which is released only when it comes into contact with liquid. In this way, the elastic thread can be positioned in the article without affecting the rest of the article. One possible way of producing this type of transport means is to treat the elastic thread with, for example, starch which fixes the thread in an extended pretensioned position. When liquid then dissolves the starch, it is possible for the elastic thread to revert to its original length and in this way move the absorption body. In order to facilitate the securing effect of the starch on the elastic thread, it is suitable to start out from a covered elastic thread, where the covering can take up the starch.

The transport means 24 can also consist of a thread which shrinks when it is exposed to wetting. The effect is the same as in the case of an elastic thread, that is to say that it moves the first absorption body 4a relative to the rest of the article. It is suitable to use this type of transport means when the structure of the article is such that it is possible to ensure that the thread will

be exposed to wetting. Examples of transport means are given in WO 00/00145 A2.

5 It is also possible to use an expanded material, for example viscose foam or superabsorbent foam, as the transport means 24. The expanded material can then push the absorption body in front of it during the movement.

10 A barrier layer 27 can be arranged between the first and the second absorption bodies. The purpose of the barrier layer 27 is to prevent transport of liquid from the first absorption body 4a to the second absorption body 4b. The barrier layer 27 can consist of, for example, an ordinary plastic film, but is in this case made from a material which is dissolved by liquid in order that the second absorption body 4b will be ready to receive the liquid on a subsequent wetting. A barrier layer which is dissolved by liquid can be made  
15 from, for example, a starch-based film. The barrier layer can also be used for reducing the friction between the two absorption bodies so as to facilitate the movement of the first absorption body 4a. Examples of barrier layers are given in US 5,916,969 A and WO 99/65974 A2.

20 In order further to distribute the liquid, two or more first absorption bodies arranged one on top of another, overlapping or beside one another in the transverse direction can be used instead of a single first absorption body. When movement takes place, the various first absorption bodies can then be moved in directions which do not necessarily have to be parallel to one  
25 another, and it is therefore possible to move them to different areas of the article.

30 As the absorbent structure 4 is enclosed between the surface layer 2 and the backing layer 3, it is important that the movable absorption body has a free passage in the article in order to be moved. This means that the materials which lie within the area of the movement must not impede the movement of the absorption body. Therefore, for example, the layers lying next to the

absorption body in the direction of movement should not be connected to other layers or other parts of the article.

Figures 4a-b show a second embodiment of an absorbent structure 4 according to the invention, seen from the side in the longitudinal direction. In the same way as before, a first absorption body 4a and a second absorption body 4b are arranged so that they at least partly overlap one another. In this case, both the first and the second absorption bodies 4a, 4b are movable in relation to the rest of the article. The absorption bodies can be anchored to one another or to the article by means of attachment 23. Here as well, a barrier layer 27, which in this case does not necessarily have to be liquid-soluble and can consist of, for example, a plastic film, is arranged between the absorption bodies so as to ensure that the first absorption body 4a retains a part of its absorbent capacity after a first wetting. One or more transport means 24 are assigned to both the absorption bodies so that they can be moved relative to one another when the means of attachment has been dissolved by liquid. As previously described, the transport means 24 can consist of, for example, pretensioned elastic threads which are attached to the absorption bodies by one 25 of their ends and to the article by their other end 26. When the absorbent structure 4 absorbs liquid on one wetting, the means of attachment 23, in the form of, for example, a liquid-soluble glue, is dissolved so that the two absorption bodies are no longer anchored to one another or to the article. When the glue is dissolved, the transport means 24 can move the absorption bodies in the desired direction and in this way free the absorption capacity for subsequent wettings.

Figures 5a-b show a third embodiment of an absorbent structure 4, seen from the side in the longitudinal direction. In this case, the absorbent structure consists of two movable first absorption bodies 4a and a non-movable second absorption body 4b which is suitably fastened to the surface layer 2 by, for example, glue. The first absorption bodies 4a are divided into two different part areas 4a', 4a'' delimited by a barrier 28 made of a liquidtight



material, for example a plastic film. The first part areas 4a' are arranged under the second absorption body 4b, when the absorbent structure is unused and therefore has not absorbed any liquid, and are separated from it by a barrier layer 27, consisting of, for example, a plastic film, which extends  
5 along virtually the entire length of the absorption body. The second part areas 4a'', on the other hand, are arranged so that they protrude in front of and behind the second absorption body 4b so as to be capable of receiving liquid on a first wetting. In the same way as described previously, the transport means 24, for example pretensioned elastic threads, are arranged  
10 on the first absorption bodies 4a, and a soluble means of attachment 23 anchors the first absorption bodies 4a to the second absorption body 4b in areas lying in front of and behind the barrier layer 27 (see Figure 5a). On the first wetting, the second absorption body 4b takes up the liquid first, after which it can then be transported down into the second part areas 4a'' of the first absorption bodies. When the liquid reaches the underside of the second  
15 absorption body, the means of attachment is dissolved, and the two first absorption bodies can be moved by the transport means 24 (see Figure 5b). By virtue of the liquid-blocking function, the barrier layer 27 and the barrier 28 have prevented the liquid from spreading to the first part areas 4a', and these  
20 can therefore be used for subsequent wettings. The absorbent structure 4 according to this embodiment can also be used for moving liquid in the transverse direction in the article instead of in the longitudinal direction as described above. In that case, the first absorption bodies can be arranged, for example, in the front part of the absorbent structure and can then  
25 constitute the T-part in a T-shaped absorbent structure or the front part in an hourglass-shaped structure. On wetting, the first absorption bodies can be moved in the lateral direction in the article, for example out into the front side panels 17, in order to achieve a greater degree of utilization of the article.

30 Figures 6a-d show a fourth embodiment of an absorbent structure 4. This structure can be used in connection with the diapers or incontinence pads described previously, but is especially suitable for urine incontinence pads

where large quantities of urine are to be dealt with in relatively short periods of time. Figure 6a shows such a urine incontinence pad seen from above, Figure 6b shows the incontinence pad seen from the side in the transverse direction, and Figures 6c-d show the absorbent structure seen from the side in the longitudinal direction. In the same way as the absorbent articles described previously, the incontinence pad shown has a surface layer 2 and a liquidtight backing layer 3 arranged on the top side and, respectively, the underside of the absorbent structure 4. It also has a front portion 5 intended to face forwards on the wearer during use and a rear portion 6 intended to face backwards on the wearer during use. However, the article is not provided with the types of fastening system described above; instead it is fitted in the crotch of the wearer between the legs of the latter by virtue of being fastened to the underwear by some form of means of attachment, preferably pressure-sensitive glue 29, arranged on the underside of the liquidtight backing layer 3. The glue can cover the entire underside, be applied in parallel strands along the underside or be applied to the underside in another suitable pattern such as, for example, a diamond pattern or spots. Arranged over the glue 29 is a detachable protective layer 30, and the protective layer 30 is removed by the wearer before fitting the incontinence pad in the underwear of the wearer. The protective layer 30 can be, for example, what is known as a release paper which can consist of a paper layer coated with silicone. The absorbent structure 4 consists of two movable first absorption bodies 4a and a second non-movable absorption body 4b. The first absorption bodies are provided with transport means 24, for example one or more pretensioned elastic threads, which are attached to the absorption body by one 25 of their ends and to, for example, the front and, respectively, the rear edge of the article by their other end 26. The first absorption bodies are suitably anchored to the second absorption body by a liquid-soluble glue 23. In this embodiment, the first absorption bodies 4a are exposed to liquid on the first wetting. When they have taken up sufficient liquid for the means of attachment 23 to be dissolved, the absorption bodies, now filled with liquid, will be moved forwards and, respectively, backwards in

the article in order that the second absorption body 4b will be ready to receive liquid on subsequent wettings. A liquid-soluble barrier layer 27 can be arranged on the top side of the second absorption body so as to prevent liquid penetrating down too rapidly into the second absorption body.

5

Figures 7a-c show a fifth embodiment of an absorbent structure 4, seen from the side in the longitudinal direction. This absorbent structure can be suitable for, for example, baby diapers (see Figures 1-2) and it moves liquid from the front portion 5 or crotch portion 6 of the diaper to the rear portion 7. In  
10 conventional baby diapers, the rear part of the absorption body is not always fully utilized as a result of the liquid, on account of capillary spreading, not being capable of being transported long distances, for which reason it is desirable for it to be possible for the liquid to be transported from the front part of the diaper to the rear in another way. Here, the structure consists of a  
15 movable first absorption body 4a, a non-movable second absorption body 4b and a non-movable third absorption body 4c arranged under the second absorption body 4b. The second absorption body 4b has an extent in the longitudinal direction which extends from the front portion 5 of the article to the rear portion 6 and is longer than the third absorption body 4c which is  
20 arranged either in the front portion 5 or the crotch portion 7 of the article. The first absorption body 4a can be positioned either directly under the second absorption body 4b behind the third absorption body 4c (see Figure 7a) or in the front portion under the third absorption body 4c (see Figure 7b). The first absorption body 4a is anchored to one of the other absorption bodies by  
25 means of attachment 23. The first absorption body 4a is provided with transport means 24, consisting of, for example, one or more pretensioned elastic threads, which are attached to the absorption body by one 25 of their ends and to, for example, the rear portion 6 of the article by their other end 26. On wetting of the article by urine, which takes place in the front portion of  
30 the article, the liquid is transported down into the absorbent structure through the second absorption body 4b and the third absorption body 4c and into the first absorption body 4a. When the means of attachment 23 has been

dissolved, the transport means 24 can move the first absorption body 4a to the rear portion of the article (see Figure 7c) and there empty the liquid into the rear, unused part of the second absorption body 4b.

- 5 The invention is not to be regarded as being limited to the embodiments above as these are intended only to illustrate the invention. The scope of the invention also includes combining characteristics from different embodiments with one another. For example, spreading layers or what is known as wadding, consisting of, for example, non-woven materials, can be arranged
- 10 on top of the absorption bodies in order to control the liquid flow in the desired direction or so as to increase the spreading of liquid before it is stored in the absorption bodies.

## CLAIMS

1. Absorbent article comprising an absorbent structure (4) enclosed  
between a surface layer (2) and a backing layer (3), where the absorbent  
5 structure (4) consists of at least one first absorption body (4a) and a second  
absorption body (4b) which are arranged so that each first absorption body  
(4a) completely or partly overlaps the second absorption body (4b), at least  
one transport means (24) being arranged on each first absorption body (4a),  
characterized in that each first absorption body (4a) is anchored to the article  
10 by a soluble means of attachment (23).
2. Absorbent article according to Claim 1, characterized in that the  
soluble means of attachment is acted on by the liquid discharged into the  
article, or a component forming part of the liquid, in such a manner that its  
15 adhesive capacity is lost or substantially weakened.
3. Absorbent article according to Claim 2, characterized in that the  
means of attachment (23) consists of a liquid-soluble glue.
- 20 4. Absorbent article according to any one of the preceding claims,  
characterized in that at least one transport means (24) is arranged on the  
second absorption body (4b).
5. Absorbent article according to any one of the preceding claims,  
25 characterized in that the absorbent structure (4) comprises a third absorption  
body (4c) arranged under the second absorption body (4b).
6. Absorbent article according to any one of the preceding claims,  
characterized in that a barrier layer (27) is arranged so that it separates each  
30 first absorption body (4a) from the second absorption body (4b).

7. Absorbent article according to Claim 4, characterized in that the barrier layer (27) is liquid-soluble.
8. Absorbent article according to any one of the preceding claims, characterized in that each first absorption body (4a) is divided into a first part area (4a') and a second part area (4a''), which part areas (4a', 4a'') are delimited from one another by a barrier (28) made of a liquidtight material.
9. Absorbent article according to any one of the preceding claims, characterized in that the at least one transport means (24) consists of an elastic thread or an elastic band.
10. Absorbent article according to any one of Claims 1-8, characterized in that the at least one transport means (24) consists of a thread which shrinks when it is exposed to wetting.
11. Absorbent article according to any one of Claims 1-8, characterized in that the at least one transport means (24) consists of an expanded material.
12. A method according to claim 1 substantially as described herein with reference to any one of figures 1 to 7.



INVESTOR IN PEOPLE

Application No: GB 0225364.9

Claims searched: 1-12

Examiner: Jason Bellia

Date of search: 8 May 2003

## Patents Act 1977 : Search Report under Section 17

### Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A	-	WO 00/00145 A1 (PROCTER & GAMBLE) See whole document
A	-	US 6346097 (BLANEY) See column 7 line 17-27 & column 6 line 5-13
A	-	US 2681032 (SHAW) See whole document

### Categories:

<b>X</b> Document indicating lack of novelty or inventive step	<b>A</b> Document indicating technological background and/or state of the art.
<b>Y</b> Document indicating lack of inventive step if combined with one or more other documents of same category.	<b>P</b> Document published on or after the declared priority date but before the filing date of this invention.
<b>&amp;</b> Member of the same patent family	<b>E</b> Patent document published on or after, but with priority date earlier than, the filing date of this application.

### Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>v</sup>:

A5R

Worldwide search of patent documents classified in the following areas of the IPC<sup>7</sup>:

A61F

The following online and other databases have been used in the preparation of this search report :

WPI, PAJ, EPODOC